

## **REMARKS/ARGUMENTS**

Applicants respond herein to the Office Action dated January 4, 2007.

Applicants' attorneys appreciate the Examiner's thorough search and examination of the present patent application.

Claims 1-7 are pending in this application. Claims 1-5 have been rejected. Claims 6 and 7 are added here.

The drawings have been objected to because Fig. 2 includes the reference numeral 7.

In response to the objection to the drawings, a paragraph of the specification beginning at page 2, line 5 has been amended to include the reference numeral 7. The reference numeral was described as "[c]ircumferential direction of the outer or inner ring" on page 7 of the specification of the present application as filed. Therefore, no new matter is being added by the amendment of the specification.

The specification has been amended to correct informalities objected to by the Examiner. The patent number on page 1, line 6 and the Figure numbers on page 5, lines 3 and 10 have been corrected.

Claims 4 and 5 have been objected to under 37 C.F.R. 1.75(c). Independent claims 1 and 3 recite that "sensors are arranged on at least one of the outer diameter of the outer ring and the inner diameter of the inner ring". Claims 4 and 5 further limit the recitations of claims 1 and 3, from which they respectively depend, by reciting "a groove in the outer diameter" and limit the arrangement of the sensors to being "arranged in the groove". That limitation is not found in claims 1 and 3.

Claims 4 and 5 stand rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. However, the groove recited in claims 4 and 5 is taught at page 4, line 3 of the specification of the present application as "sensors 4 are arranged in a groove 5 on the outer ring 2."

Before discussing the prior art in detail, the essence of the invention is, as noted at page 2 of Applicant's specification:

The essence of the invention consists in arranging sensors (e.g., strain gauge sensors) ... which generate time signals of different length in the event of loading (Hertzian compression) of the rings by the rolling bodies depending on the axial position in the raceways in the rolling bearing...The time signal of different



length in the event of loading are thus proportional to the contact angle of the rolling bodies in the raceway in the rolling bearing ring.

This new concept is not suggested in any of the prior art structures, i.e., arranging strain gauge sensors so that the axial position of the rolling bodies in the raceways is sensed. In all the prior art cited, reliance is on deformation and strain itself, not axial position of rolling elements. The invention is distinguishable from the prior art.

Claim 1 stands rejected under 35 U.S.C. §103(a) as being unpatentable over United Kingdom Patent Application No. GB 2 113 845 to Baully ("Baully") in view of U.S. Patent No. 4,175,429 to Keck ("Keck"). Reconsideration is requested.

Claim 1 is directed to a rolling bearing that includes inner and outer rings having opposing, cooperating curved raceways. Claim 1 recites "a plurality of rolling bodies arranged between the raceways for rolling along the raceways in a circumferential direction... and movable in an axial direction..." as is typical of rolling bearings. The claims provide strain gauge sensors responsive to axial movement of the rolling bodies, in the form of a sensor not suggested in the art. Support and discussion of these claim limitations is found at page 2, paragraph 2 of the specification.

Baully is directed to monitoring loads in rotating bearings. Baully describes balls 12 passing inside a sleeve created by the inner and outer races 11 and 13. Baully describes strain gauges 24 in recesses 21-25, but contains no suggestion of geometry or topography of the sensors, and no suggestion of applicant's sensor configuration or of how applicants novel construction sense a load on a rolling bearing.

Keck is not directed to a rolling bearing and does not remedy the above-identified deficiencies of Baully. Keck teaches nothing of how to shape or place a strain gauge in a rolling bearing or in any comparable structure. A resistance wire with a wiggly shape is not adjacent conductor track sections of different lengths and are not in a row in the axial direction. Keck has no axial direction. The reference combinations asserted by the Examiner would be unobvious and does not suggest claim 1.

Claim 2 is rejected under 35 U.S.C. §103(a) as being unpatentable over Baully in view of Keck and further in view of U.S. Patent No. 6,596,949 to Stimpson ("Stimpson").



Reconsideration is requested.

Since Bauly as modified Keck was cited for the features in claim 1, the arguments above as to claim 1 apply to this rejection as well.

Stimpson is so far removed from the subject of the present invention and from the structure of the present invention that it is not relevant prior art for consideration. Applicant claims a rolling bearing. Stimpson discloses a weighing assembly with a load cell. Applicant's rolling bearing has rolling bodies and raceways. A load cell has none of that. Applicant is tracking the load on a rolling bearing and uses strain gauge sensors on a bearing ring for determining that. Stimpson does not have rolling bodies or a bearing rings and is not making a dynamic measurement of strain in a dynamically moving rolling bearing, but rather is measured in a load cell.

Stimpson's conductor tracked sections are unrelated to Applicant's. As noted at column 5, lines 45-56, the slanted runs in Stimpson appear to be spring-like units. "The slanted runs 86 of strain gauges 83 would be slightly stretched...while the slanted run 88 of strain gauges 82 will become slightly compressed." This does not disclose a trapezoidal array, nor an array of adjacent conductors tracks sections as Applicant has claimed, Stimpson is not relevant prior art.

Assuming Stimpson could be combined with Keck and/or Bauly because Stimpson might be somehow related to a rolling bearing. Claim 2 is not as shown nor suggested in these references. There is no suggestion of how a strain gauge as in Stimpson made be substituted into the bearing of Bauly, because Bauly measures load on a bearing while Stimpson measures weight on a stationary load. There is no obvious way to substitute one for the other and no place in Bauly to receive or use the structure as in Stimpson. Keck, like Stimpson, shows a weight sensor and not relevant prior art.

Claim 3 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Bauly in view of U.S. Patent No. 6,619,102 to Salou et al. ("Salou"). Reconsideration is requested.

As to Bauly, See above.

Bauly as noted above was inapplicable to claim 1 and is also inapplicable as prior art to claim 3.

Salou shows a force measuring strain gauge arrangement in a raceway. But it is a quite different structure than as claimed. Applicant's claim 3 measures force by sensors on one of the



outer and inner rings as claimed and by placing those sensors so that the distance between them varies and a measurement of where the rolling bodies are in the raceway results from the recited arrangement of sensors. In contrast, as described in Salou, the deformation of the strain gauges themselves determines load. It is not where the balls are in the raceways, but how much the plates on which the strain gauges are disposed deform that determines load, and the placement on the rings determines the load, not the bending of a plate as in Salou. Substituting a bendable plate with string gauges into Baully from Salou still does not show or suggest Applicant's claim 3.

Claim 4 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Baully in view of Stimpson and further in view of U.S. Patent No. 4,117,719 to Schutz ("Schutz"). Reconsideration is requested.

Applicant has shown the inapplicability of the combination of Baully and Stimpson to parent claim 1. That Schutz may show a groove does not avoid the limitations of claim 3, the parent of claim 4, which is discussed in the rejection next below in the Office Action herein. The basic invention of claim 3 is distinguishable from the prior art and therefore claim 4 is distinguishable from the art and is allowable as well, whether or not a groove is claimed.

Claim 5 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Baully in view of Salou and further in view of Schutz. Reconsideration is requested.

The allowability of claim 5 is asserted in view of the allowability of claim 1. The comments as to the grooves in the recitation of claim 4 apply to claim 5 as well.

In summary, the rejected claims distinguish from and are allowable over the prior art.

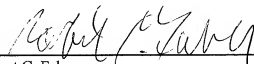
New claim 6 and 7 are dependent upon claim 3 whose allowability has been discussed. Claim 6 concerns the distance between two circumferentially adjacent sections in axially adjacent rows, as seen in Applicant's Figs. 4 and 5 and not as shown or suggested in the art. Claim 7 is supported in Applicant's Figs. 2 and 3 and is also not shown or suggested in the prior art. Allowance of claims 6-7 is requested as well.



Accordingly, the Examiner is respectfully requested to reconsider the application, allow the claims as amended.

THIS CORRESPONDENCE IS BEING  
SUBMITTED ELECTRONICALLY THROUGH  
THE PATENT AND TRADEMARK OFFICE EFS  
FILING SYSTEM ON May 4, 2007.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Robert C. Faber", is written over a horizontal line.

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